

- 17 -

Claims

1. A method to assess therapeutic levels of S-adenosylmethionine (SAM) in a biological fluid sample which method comprises
5 providing said sample with glycine N-methyltransferase (GMT), a S-adenosyl homocysteine hydrolase (SAHH) or His•SAHH, and glycine; and
measuring one or more reaction products in said sample wherein the level(s) of said one or more reaction products is directly proportional to the level of SAM in the sample.
- 10 2. The method of claim 1 wherein the product detected is homocysteine (HC).
3. The method of claim 2 wherein said HC is measured by a method which comprises treating the sample with homocysteinase (HCYase) and measuring the concentration of at least one product obtained by the reaction of HCYase with said
15 homocysteine.
4. The method of claim 3 wherein the product measured is H₂S.
5. The method of claim 4 wherein said H₂S is measured by fluorescence or is measured by absorbance.
6. The method of claim 1, wherein the SAHH comprises an amino acid
20 sequence encoded by SEQ ID NO:1.
7. A kit for assaying a sample containing SAM, the kit comprising SAHH or His•SAHH, GMT, glycine and instructions for use.

- 18 -

8. An assay comprising:
a biological sample containing SAM; and
GMT, glycine, and SAHH or His•SAHH,
wherein SAHH or His•SAHH activity results in a product that is capable of being
5 measured to determine the amount of SAM in the sample.

9. An isolated nucleic acid molecule comprising SEQ ID NO:1.

10. The nucleic acid molecule defined in claim 9 further comprising a
sequence for coding a 6 x His Tag at the N-terminus.

11. A method for efficient production of S-adenosyl homocysteine hydrolase
10 which method comprises expressing a cassette comprising the nucleic acid molecule
defined in claim 9.

12. A method for efficient production of His•S-adenosyl homocysteine
hydrolase which method comprises expressing a cassette comprising the nucleic acid
15 molecule defined in claim 10.

13. The method of claim 11 wherein said cassette is expressed in *E. coli*.

14. The method of claim 12 wherein said cassette is expressed in *E. coli*.

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15. A method of purifying His•S-adenosyl homocysteine hydrolase
comprising:

precipitating a suspension containing the His•S-adenosyl homocysteine hydrolase
produced by the method of claim 12 with ammonium sulfate to produce a supernatant and
25 a precipitate; and

- 19 -

subjecting the supernatant to His Tag recognizing affinity chromatography.

16. A method of purifying His•S-adenosyl homocysteine hydrolase with a single chromatography step comprising

5 subjecting the His•S-adenosyl homocysteine hydrolase produced by the method of claim 12 with to Ni-NAT affinity chromatography.

10 17. A method of measuring homocysteine in a biological fluid comprising contacting said fluid with a His•S-adenosyl homocysteine hydrolase produced by the method of claim 15 and measuring the homocysteine to SAH conversion in said fluid.

15 18. A composition comprising His•S-adenosyl homocysteine hydrolase which yields a single band upon analysis by SDS polyacrylamide gel electrophoresis wherein said His•S-adenosyl homocysteine hydrolase is prepared by the method of claim 15.

20 19. A method of depleting excess homocysteine in a biological fluid *in vivo* or *ex vivo* comprising contacting said fluid with a SAHH produced by the method of claim 15.

20 20. An *E. coli* host cell which comprising the nucleic acid molecule of claim 9.

10 21. An *E. coli* host cell which comprising the nucleic acid molecule of claim 10.